

18. An optical fiber coating apparatus for applying first and second coating resins as laminate to the outer periphery of an optical fiber, in accord with claim 15, wherein said apparatus is configured to provide a fiber linear velocity between about 500 m/min to about 1200 m/min.

19. An optical fiber coating apparatus for applying first and second coating resins as laminate to the outer periphery of an optical fiber, in accord with claim 15, wherein said apparatus is configured to provide a fiber linear velocity of approximately 1000 m/min.

REMARKS

THE ALLOWED CLAIMS

Claims 5 and 6-9 were acknowledged to contain allowable subject matter.

Claim 5 has been amended to over the 35 U.S.C. § 112, second paragraph rejection, noted below, and claim 6 has been rewritten in independent form to place each of claims 6-9 in condition for allowance and such allowance is solicited.

IN THE DRAWINGS

Applicants enclose herewith a drawing change authorization request requesting amendment of Figure 7 to expressly designate the first die hole land portion and tapered portion. The requested changes are indicated by red ink in the attached drawing. Approval is requested.

THE 35 U.S.C. § 112, SECOND PARAGRAPH REJECTION

Claims 5 and 10-13 were rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Specifically, it was alleged the term “said circular truncated cone” in claims 10-13 lacked proper antecedent basis as did the term “the head portion” in claims 5, 11, and 13.

Definiteness of claim language must be analyzed in light of the content of the application disclosure, the teachings of the prior art, and the claim interpretation that would be given by one of ordinary skill in the art at the time the invention was made. The essential inquiry is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity.

Claim 5 is hereby amended to recite “a head portion” in lieu of “the head portion”. This language corresponds, for example, to the disclosure on page 20, lines 7-19, which relate to Fig. 8. It is submitted that antecedent basis is proper and the claim is sufficiently definite as claim 5 sets forth and circumscribes a particular subject matter with a reasonable degree of clarity. Withdrawal of this aspect of the rejection is requested.

It is respectfully submitted that the amendments to claims 10-13 herein address and overcome the noted antecedent deficiency. Entry of the amendments thereto is respectfully requested, as is withdrawal of this aspect of the rejection.

Additionally, it is noted that claims 12 and 13, as originally presented, contained a spelling error. Claims 12 and 13 are amended herein to replace “a first *costing* die” with “a first *coating* die” to correct this spelling error.

For the above reasons, it is requested that the 35 U.S.C. § 112, second paragraph rejection be withdrawn.

THE 35 U.S.C. § 103 REJECTIONS

Claims 3-4 and 10-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over **Taylor** (U.S. Pat. No. 4,474,830).

Claims 3-4 and 10-13 are also rejected under 35 U.S.C. § 103(a) as being unpatentable over **JP 09241042**.

Claims 3-4 and 10-13 have been amended to recite a first coating die having a first die hole through which said optical fiber is inserted and a basically disk-shaped lower end face with a protrusion projecting in the passing direction of said optical fiber, wherein the first die hole comprises a taper portion and a cylindrical land portion formed continuously therewith and wherein a lower aperture of said land portion is opened in said lower end face.

PROTRUSION IS NOT TAUGHT OR SUGGESTED BY APPLIED ART

It is respectfully submitted that neither **Taylor** nor **JP 09241042** teach or suggest these features, as claimed and as discussed in part, for example, on page 17, lines 23-26 and illustrated in the attached revised Figure 7 expressly labeling such land portion L_p and taper portion T_p . As disclosed by Applicants, a protrusion or protruding structure, as claimed, disposed adjacent the optical fiber can directly affect the coating of the optical fiber. In particular, a protrusion provided at an exit port of the land portion of the first coating die stabilizes a centering force by reducing a lower pressure region extremely near an optical fiber drawing out from an exit port of the first coating die (see, e.g., page 5, line 18 to page 6, line 18).

Providing a protrusion on the land portion prevents low pressure regions of the resin from forming near the outlet of the land portion provided on a lower end face of the first coating die. That is, the flow of the second coating resin B within the gap 10 is regulated such that occurrence of annular lower-pressure regions in the region surrounding the optical fiber 1 exiting

from the first die hole are prevented, thereby restraining fluctuations occurring in the interface between the first coating resin A and the second coating resin B applied to the optical fiber 1 immediately after the optical fiber exits the first die hole 30 (see page 19, lines 9-26 of Applicant's specification). The claimed invention accordingly permits substantially uniform application of resin coatings in a high speed optical fiber drawing process.

In contrast, **Taylor** shows that the first coating die having a first die hole comprising a taper portion (not numbered) and a cylindrical land portion 205 formed continuously therewith wherein a lower aperture of said land portion is opened in said lower end face. However, **Taylor** does not teach or suggest providing a protrusion projecting from the lower end face, as claimed. Moreover, since the claims define the lower aperture of said land portion as opening in said lower end face, interpretation of the face of **Taylor's** first die disposed adjacent the uppermost portion of reservoir 209 as the claimed "lower end face" would be unreasonable and improper.

Similarly, **JP 09241042** teaches a first coating die 2 having a first die hole comprising a taper portion (not numbered) and a cylindrical land portion (not numbered) formed continuously therewith wherein a lower aperture of said land portion is opened in said lower end face. However, **JP 09241042** do not teach or suggest providing a protrusion projecting from the lower end face, as claimed. As noted above, since the claims define the lower aperture of said land portion as opening in said lower end face, interpretation of the face of **JP 09241042's** first die 2 disposed adjacent the uppermost portion of reservoir 5 as the claimed "lower end face" would be unreasonable and improper.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior

art". *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970); *see also In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995)(*stating* "[w]hen evaluating the scope of a claim, every limitation in the claim must be considered"). It is therefore submitted that not every limitation of claims 3-4 and 10-13 are taught or suggested by **Taylor** or **JP 09241042**, taken singly or in combination. Withdrawal is accordingly requested for at least this reason.

PROTRUSION DIMENSIONS ARE NOT TAUGHT OR SUGGESTED BY APPLIED ART

In the Examiner's response to the arguments filed on September 5, 2001, Applicant respectfully submits that the Examiner's conclusions are erroneous.

The Examiner took issue with the Applicant's statement that neither **Taylor** nor **JP 09241042** teaches or suggests a protrusion having a height (H) defined within a range of gap (G) sizes in accord with $0.05G < H < 0.5G$, as claimed. The Examiner stated that "[t]he specification at page 22-23 and the Table on page 21 appear to suggest that the combination of relationships set forth at lines 5-7 of page 23 must be met to provide for the suppression of the outside diameter fluctuation". Applicants submit that this statement is in error. For example, page 4, line 11 to page 6, line 26 discuss a CFD (computational fluid dynamics) computer simulation performed on one aspect of the invention wherein "the first layer die hole is provided with a beak-shaped protrusion having a height of 0.1 mm and a skirt width of 0.1 mm (corresponding to the coating apparatus of the present invention)" (page 5, lines 3-6). Although the beak-shaped portion (e.g., Fig. 5C) yields a smaller reduction in the lower-pressure region 15 (see page 6, lines 13-18), such results are nevertheless beneficial and are encompassed within the scope of the invention. In other words, the Examiner's conclusion that "the combination of relationships set forth at lines 5-7 of page 23 must be met to provide for the suppression of the outside diameter fluctuation" is incorrect as, in the above example, the dimension "L" (see, e.g., Fig. 8) is omitted.

Therefore, all of the combinations of relationships set forth at lines 5-7 of page 23 are not simultaneously required in accord with the invention and subsets thereof are considered within the scope of the claimed invention and within the scope of Applicant's disclosure.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art". *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970); *see also In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995)(stating "[w]hen evaluating the scope of a claim, every limitation in the claim must be considered"). It is therefore submitted that not every limitation of claims 3-4 and 10-13 are taught or suggested by **Taylor** or **JP 09241042**, taken singly or in combination, as these references fail to teach or suggest a protrusion, as claimed, satisfying (1) $0.05G < H < 0.5G$ wherein H is the height of said protrusion, and G is the distance of the gap between said first and second coating dies (claim 3); (2) $(D_2 - D_1)/2 < W < G$, wherein further to the above, W is the distance between the outer periphery of the bottom portion of said circular truncated cone and the inner peripheral face of said first die hole, D_1 is the inner peripheral face diameter of said first die hole on the outlet side of said optical fiber, and D_2 is the inner peripheral face diameter of said second die hole on the inlet side of said optical fiber (claim 10); (3) $0.01 \text{ mm} \leq L < W$, wherein further to the above L is the distance between the outer periphery of the head portion of said circular truncated cone and the inner peripheral face of said first die hole; (4) $0.05G < H < 0.5G$ and $(D_2 - D_1)/2 < W < G$ (claim 12); and (5) $0.05G < H < 0.5G$ and $0.01 \text{ mm} \leq L < W$ (claim 13).

As noted above, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka, supra*. It is submitted that

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not every limitation of claims 3-4 and 10-13 are taught or suggested by **Taylor** or **JP 09241042**, taken singly or in combination for at least the reasons provided above. Withdrawal is accordingly requested.

NEW CLAIMS 14-19

Claims 14-19 are hereby added.

It is respectfully submitted that new claims 14-19 are patentable over the applied references for at least the reasons noted above. Moreover, it is submitted that neither **Taylor** or **JP 09241042** have been shown to teach or suggest an optical fiber coating apparatus configured to provide a fiber linear velocity between about 500 m/min to about 1200 m/min. Instead, **Taylor** disclose a fiber draw rate of only 1.8 m/s (col. 4, lines 46-47), which is significantly less than that claimed. The English-language abstract of **JP 09241042** does not mention fiber linear velocity and the disclosure appears to contain no numerals characterized by a speed (distance/time).

Accordingly, allowance of new claims 14-19 is respectfully solicited.

Attached hereto is a marked-up version of the changes made to the claims and to the amendment . The attached page is captioned VERSION WITH MARKINGS TO SHOW CHANGES MADE.

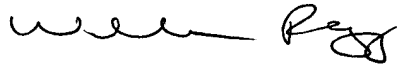
To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including

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extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please amend the paragraph starting on page 17, line 10 and ending on page 17, line 26 as follows:

This apparatus comprises a first coating die 3 having a first die hole 30 through which the optical fiber 1 is inserted, and a second coating die 4 having a second die hole 40 disposed concentric with the first die hole 30 and downstream therefrom in the passing direction of the optical fiber 1. The inside diameter of the first die hole 30 is set greater than the outside diameter of the optical fiber 1, and the inside diameter of the second die hole 40 is set greater than the first die hole 30. On the outlet side of the optical fiber 1, the first die hole 30 is provided with a protrusion 5 projecting toward the second die hole 40, whereas a gap 10 for injecting the second coating resin B into the second die hole 40 is formed between the first coating die 3 and the second coating die 4. The first die hole 30 is constituted by a taper portion T_p and a cylindrical land portion L_p formed continuously therewith, having a smaller inside diameter.

IN THE CLAIMS:

Please amend the claims as follows:

3. An optical fiber coating apparatus for applying first and second coating resins as laminate to the outer periphery of an optical fiber, said apparatus comprising:

a first coating die having a first die hole through which said optical fiber is inserted, a basically disk-shaped lower end face with a protrusion projecting in the passing direction of said optical fiber, wherein said first die hole comprising a taper portion and a cylindrical land portion formed continuously therewith, a lower aperture of said land portion is opened in said lower end

face, and said first die hole and the outer periphery of said optical fiber therein forms a space therebetween into which said first coating resin is injected; and

a second coating die having a second die hole which is concentric with said first die hole and through which said optical fiber passed through said first die hole is inserted and an upper end face comprising a circular plate opposing the lower end face of said first coating die so as to form a gap through which said second coating resin is injected into a space formed between said second die hole and the outer periphery of said optical fiber therein;

said protrusion being formed so as to reduce an annular low-pressure region formed around said optical fiber in a flow of said second coating resin within said gap; and wherein

said apparatus satisfies:

$$0.05G < H < 0.5G$$

wherein H is the height of said protrusion, and G is the distance of the gap between said first and second coating dies.

5. An optical fiber coating apparatus for applying first and second coating resins as a laminate to the outer periphery of an optical fiber, said apparatus comprising:

a first coating die having a first die hole through which said optical fiber is inserted and a basically disk-shaped lower end face with a protrusion projecting in the passing direction of said optical fiber and formed around said first die hole, said first die hole and the outer periphery of said optical fiber therein forming a space therebetween into which said first coating resin is injected; and

a second coating die having a second die hole which is concentric with said first die hole and through which said optical fiber passed through said first die hole is inserted and an upper

end face comprising a circular plate opposing the lower end face of said first coating die so as to form a gap through which said second coating resin is injected into a space formed between said second die hole and the outer periphery of said optical fiber therein;

said protrusion being formed so as to reduce an annular lower-pressure region formed around said optical fiber in a flow of said second coating resin within said gap; and said protrusion is shaped like a circular truncated cone, wherein said apparatus satisfies:

$$0.05G < H < 0.5G$$

$$(D_2 - D_1)/2 < W < G$$

$$0.01 \text{ mm} \leq L < W$$

where H is the height of the circular truncated cone of said protrusion, W is the distance between the outer periphery of the bottom portion of said circular truncated cone and the inner peripheral face of said first die hole, L is the distance between the outer periphery of [the] a head portion of said circular truncated cone and the inner peripheral face of said first die hole, D_1 is the inner peripheral face diameter of said first die hole on the outlet side of said optical fiber, D_2 is the inner peripheral face diameter of said second die hole on the inlet side of said optical fiber, and G is the distance of the gap between said first and second coating dies.

6. An optical fiber coating apparatus [according to claim 3, further]for applying first and second coating resins as a laminate to the outer periphery of an optical fiber, said apparatus comprising:

a first coating die having a first die hole through which said optical fiber is inserted and a basically disk-shaped lower end face with a protrusion projecting in the passing direction of said optical fiber and formed around said first die hole, said first die hole and the outer periphery of

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said optical fiber therein forming a space therebetween into which said first coating resin is injected;

a second coating die having a second die hole which is concentric with said first die hole and through which said optical fiber passed through said first die hole is inserted and an upper end face comprising a circular plate opposing the lower end face of said first coating die so as to form a gap through which said second coating resin is injected into a space formed between said second die hole and the outer periphery of said optical fiber therein; and

a positioning member having a cylindrical inner peripheral face adapted to fit the respective outer peripheral faces of said first and second coating dies,

each of said first and second coating dies and the inner peripheral face of said positioning member being constituted by a material having a Young's modulus of 5×10^4 kg/mm² or greater and a coefficient of thermal expansion of $6 \times 10^{-6}/^{\circ}\text{C}$ or lower,

said protrusion being formed so as to reduce an annular lower-pressure region formed around said optical fiber in a flow of said second coating resin within said gap

and wherein said apparatus satisfies:

$$0.05G < H < 0.5G$$

wherein H is the height of said protrusion, and G is the distance of the gap between said first and second coating dies.

12. An optical fiber coating apparatus for applying first and second coating resins as a laminate to the outer periphery of an optical fiber, said apparatus comprising:

a first [costing] coating die having a first die hole through which said optical fiber is inserted and a basically disk-shaped lower end face with a protrusion projecting in the passing

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direction of said optical fiber and formed around said first die hole, said first die hole comprising a taper portion and a cylindrical land portion formed continuously therewith, a lower aperture of said land portion is opened in said lower end face, and

said first die hole and the outer periphery of said optical fiber therein forming a space therebetween into which said first coating resin is injected; and

a second coating die having a second die hole which is concentric with said first die hole and through which said optical fiber passed through said first die hole is inserted and an upper end face comprising a circular plate opposing the lower end face of said first coating die so as to form a gap through which said second coating resin is injected into a space formed between said second die hole and the outer periphery of said optical fiber therein;

said protrusion being formed so as to reduce an annular lower-pressure region formed around said optical fiber in a flow of said second coating resin within said gap, and said apparatus satisfying

$$0.05G < H < 0.5G$$

$$(D_2 - D_1)/2 < W < G$$

where H is the height of the circular truncated cone of said protrusion, W is the distance between the outer periphery of the bottom portion of said circular truncated cone and the inner peripheral face of said first die hole, D_1 is the inner peripheral face diameter of said first die hole on the outlet side of said optical fiber, D_2 is the inner peripheral face diameter of said second die hole on the inlet side of said optical fiber, and G is the distance of the gap between said first and second coating dies.

13. An optical fiber coating apparatus for applying first and second coating resins as a laminate to the outer periphery of an optical fiber, said apparatus comprising:

a first [costing] coating die having a first die hole through which said optical fiber is inserted and a basically disk-shaped lower end face with a protrusion projecting in the passing direction of said optical fiber and formed around said first die hole, said first die hole comprising a taper portion and a cylindrical land portion formed continuously therewith, a lower aperture of said land portion is opened in said lower end face, and said first die hole and the outer periphery of said optical fiber therein forming a space therebetween into which said first coating resin is injected; and

a second coating die having a second die hole which is concentric with said first die hole and through which said optical fiber passed through said first die hole is inserted and an upper end face comprising a circular plate opposing the lower end face of said first coating die so as to form a gap through which said second coating resin is injected into a space formed between said second die hole and the outer periphery of said optical fiber therein;

said protrusion being formed so as to reduce an annular lower-pressure region formed around said optical fiber in a flow of said second coating resin within said gap, and said apparatus satisfying

$$0.05G < H < 0.5G$$

$$0.01 \text{ mm} \leq L < W$$

where H is the height of the circular truncated cone of said protrusion, W is the distance between the outer periphery of the bottom portion of said circular truncated cone and the inner peripheral face of said first die hole, L is the distance between the outer periphery of the head portion of

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said circular truncated cone and the inner peripheral face of said first die hole, and G is the distance of the gap between said first and second coating dies.